

## IN THE CLAIMS

Please cancel claims 17 through 41 and 43 through 46. Please add the following new claims 48 through 81. Thus, claims 48 through 81 are pending upon entry of this amendment. Claims 42 and 47 are withdrawn from consideration.

-- 48. A cascade genetic circuit, comprising:

a) a plurality of transcriptional regulators encoded on one or more nucleic acid constructs; and

wherein expression of an upstream transcriptional regulator from said plurality of transcriptional regulators stimulates expression of at least one downstream transcriptional regulator from said plurality of transcriptional regulators;

wherein at least two of said plurality of transcriptional regulators are responsive to an inducer;

b) a target promoter;

wherein said target promoter is responsive to a downstream transcriptional regulator of said plurality of transcriptional regulators;

c) wherein said cascade genetic circuit is provided in vitro, in gram negative bacteria or in cultured eukaryotic cell.

49. The cascade genetic circuit of claim 48, wherein at least two of said plurality of transcriptional regulators are responsive to the same inducer.

50. The cascade genetic circuit of claim 48, wherein said inducer comprises a benzoate derivative.

51. The cascade genetic circuit of claim 48, wherein said benzoate derivative is a substituted salicylate molecule or salicylate.

52. The cascade genetic circuit of claim 48, wherein at least one of said plurality of transcriptional regulators comprises a polypeptide.

53. The cascade genetic circuit of claim 48, wherein at least one of said plurality of transcriptional regulators is encoded by an exogenous nucleic acid molecule.

54. The cascade genetic circuit of claim 48, wherein at least two of said plurality of transcriptional regulators are encoded on the same or different exogenous nucleic acid molecules.

55. The cascade genetic circuit of claim 48, wherein the expression of at least one of said plurality of transcriptional regulators is modulated by a nucleic acid molecule having the transcription modulating activity of *nahR*.

56. The cascade genetic circuit of claim 48, wherein the expression of at least one of said plurality of transcriptional regulators is modulated by a nucleic acid molecule having the transcription modulating activity of *Psal*.

57. The cascade genetic circuit of claim 48, wherein the expression of at least one of said plurality of transcriptional regulators is modulated by a nucleic acid molecule having the transcription modulating activity of *XylS2*.

58. The cascade genetic circuit of claim 48, wherein said target promoter comprises a nucleic acid molecule having the promoter activity of  $P_m$ .

59. The cascade genetic circuit of claim 48, wherein at least one of said at least two transcriptional regulators regulates the expression of at least one other of said at least two transcription regulators that is responsive to the same inducer.

60. The cascade genetic circuit of claim 48, wherein said inducer modulates at least one of said plurality of transcriptional regulators that regulates the activity of said target promoter.

61. The cascade genetic circuit of claim 48, wherein the activity of said target promoter is multiplicative.

62. The cascade genetic circuit of claim 48, wherein said target promoter regulates the expression of a moiety of interest.

63. The cascade genetic circuit of claim 48, wherein said target promoter is operably linked to a nucleic acid molecule that encodes a moiety of interest.

64. The cascade genetic circuit of claim 63, wherein said nucleic acid molecule that encodes a moiety of interest is exogenous to a genome or endogenous to a genome.

65. The cascade genetic circuit of claim 48, wherein said cascade genetic circuit is provided in vitro.

66. The cascade genetic circuit of claim 48, wherein said cascade genetic circuit is provided in gram negative bacteria.

67. The cascade genetic circuit of claim 48, wherein said cascade genetic circuit is provided in cultured eukaryotic cell.

68. A cell comprising a cascade genetic circuit, wherein said cascade genetic circuit comprises:

- a plurality of transcriptional regulators encoded on one or more nucleic acid constructs; and  
wherein expression of an upstream transcriptional regulator from said plurality of transcriptional regulators stimulates expression of a downstream transcriptional regulator from said plurality of transcriptional regulators;  
wherein at least two of said plurality of transcriptional regulators are responsive to an inducer;
- a target promoter;  
wherein said target promoter is responsive to a downstream transcriptional regulator of said plurality of transcriptional regulators.
- wherein said cell is a gram negative bacteria or a cultured eukaryotic cell.

69. The cell of claim 68, wherein said cell is a gram-negative bacterial cell.

70. The cell of claim 68, wherein said cell is a cultured eukaryotic cell.

71. The cell of claim 68, wherein said eukaryotic cell is selected from the group consisting of mammalian cells, insect cells, yeast cells and plant cells.

72. A method regulating the expression of a nucleic acid molecule, comprising:

- providing or establishing a cascade genetic circuit;
- placing said nucleic acid molecule under control of a target promoter; and
- inducing said cascade genetic circuit to regulate the expression of said nucleic acid molecule.

wherein said cascade genetic circuit is provided in vitro, in gram negative bacteria or in cultured eukaryotic cell.

73. The method of claim 72, wherein said nucleic acid molecule encodes a moiety selected from the group consisting of a hormone, an enzyme, a growth factor, a apolipoprotein, a therapeutic protein, a diagnostic molecule, a diagnostic protein, a diagnostic reporter molecule, a reporter molecule, an anti-sense molecule, a ribozyme, an rRNA, a tRNA, an snRNA, and portions or derivatives thereof.

74. The method of claim 72, wherein said cascade genetic circuit is provided in vitro.

75. The method of claim 72, wherein said cascade genetic circuit is provided in gram negative bacteria.

76. The method of claim 72, wherein said cascade genetic circuit is involved in cultured eukaryotic cell.

77. A method of making a moiety, comprising:

- providing or establishing a cascade genetic circuit;
- placing a nucleic acid molecule that encodes a polypeptide under control of a target promoter; and
- inducing said cascade genetic circuit to regulate the expression of said

polypeptide.

wherein said cascade genetic circuit is provided in vitro, in gram negative bacteria or in cultured eukaryotic cell.

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78. The method of claim 77, wherein said nucleic acid molecule encodes a moiety selected from the group consisting of a hormone, an enzyme, a growth factor, a apolipoprotein, a therapeutic protein, a diagnostic molecule, a diagnostic protein, a diagnostic reporter molecule, a reporter molecule, an anti-sense molecule, a ribozyme, an rRNA, a tRNA, an snRNA, and portions or derivatives thereof.

79. The method of claim 77, wherein said cascade genetic circuit is provided in vitro.

80. The method of claim 77, wherein said cascade genetic circuit is provided in gram negative bacteria. *C*

81. The method of claim 77, wherein said cascade genetic circuit is provided in cultured eukaryotic cell. - -